

# SiC Matrix Composites for High Temperature Hypersonic Vehicle Applications, Phase II

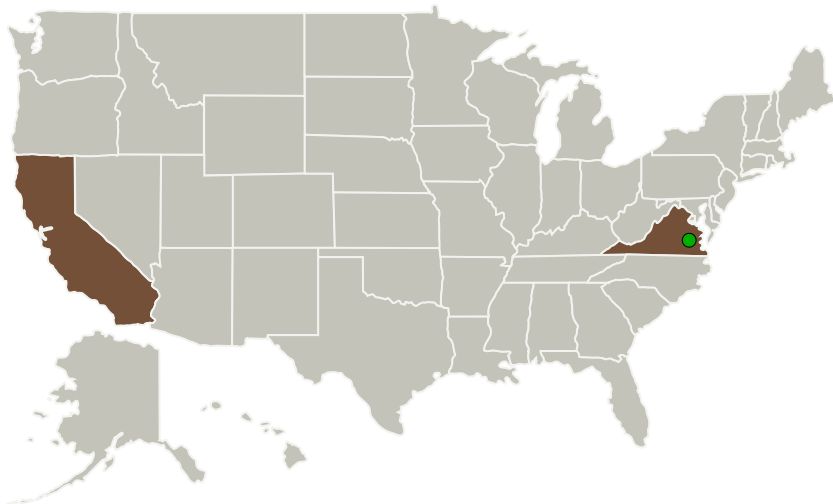
Completed Technology Project (2011 - 2014)



## Project Introduction

Durable high temperature materials are required for reusable hypersonic structural thermal protection systems. In particular, temperatures exceeding 2700°F, and approaching 3000°F, are targeted for capable structural materials that can survive stresses on the order of 10 ksi (70 MPa) for at least 100 hours in an oxidizing environment. Such materials have been identified as an enabling material for future hypersonic vehicles. As this application is structural, a strong degree of damage tolerance is desired, and thus ceramic matrix composites are the primary choice due to the desire for reduced weight, high temperature strength and oxidation resistance. Silicon carbide fiber-reinforced silicon carbide matrix (SiC/SiC) composites are believed to be the most suitable solution due to meeting the requirements with the limitations of creep at the highest temperatures/loads, and oxidative attack at stresses that exceed the materials proportional limit. The proposed effort will define the temperature-stress limit of SiC/SiC composites, and examine methods to further extend this limit.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Rolls-Royce High Temperature Composites Inc	Lead Organization	Industry	Huntington Beach, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

## Project Transitions

▶ **June 2011:** Project Start

✓ **June 2014:** Closed out

**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139328>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Rolls-Royce High Temperature Composites Inc

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Robert Shinavski

**Co-Investigator:**

Robert Shinavski

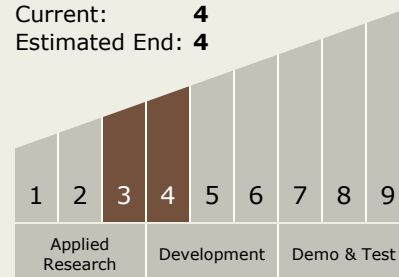
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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.4 Advanced Electronic Parts

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System